CLAIMS

What is claimed is:

1. A composite material comprising:

a matrix mixture of an epoxy resin and a hardener, the epoxy resin and hardener being essentially free of methylenedianiline (MDA) and vinylcyclohexene dioxide; and

a fiber reinforcement within the matrix,

wherein:

the matrix has a glass transition temperature of at least 250°F dry; and

the resin has a pre-hardening mixed viscosity of 500-1500 cP at 75°F; and

the composite material has, upon hardening, an interlaminar shear strength of at least 6.5 ksi dry at 75°F and at least 3.5 ksi dry at 250°F.

2. The material of claim 1 wherein:

the composite material has a fiber tensile strength of at least 650 ksi; and

the fiber reinforcement comprises an intermediate modulus, high tensile strength, carbon fiber.

3. The material of claim 1 used in a filament-wound pressure vessel.

4. The material of claim 3 wherein the vessel is a space vehicle or missile combustion chamber or propellant or oxidizer tank.

5. The material of claim 1 wherein:

the matrix hardens to B-stage in less than 20 hours at a temperature of 100°-150°F.

6. A method for manufacturing a composite material comprising:

forming a blend of:

a resin selected from the group consisting of low viscosity bisphenol A/epichlorohydrin resins, low viscosity cycloaliphatic resins, and low viscosity tetra functional epoxy resins; and

a hardener selected from the group consisting of liquid aromatic amine hardeners effective to provide glass transition temperatures in excess of 250°F, the blend being essentially free of methylenedianiline (MDA) and vinylcyclohexene dioxide;

embedding fiber reinforcement in the blend; and

curing the fiber-reinforced blend to form the composite material having an interlaminar shear strength of at least 6.5 ksi dry at 75°F and 3 ksi dry at 250°F and a fiber tensile strength of at least 650 ksi in a filament-wound pressure vessel at 75°F.

7. The method of claim 6 wherein the fiber reinforcement is a high tensile strength intermediate modulus carbon fiber and the method further comprises forming the blend with a reactive diluent comprising diglycidyl ether of 1,4-butanediol, the diluent also being essentially free of (MDA) and vinylcyclohexene dioxide.

8. The method of claim 6 wherein:

the blend further comprises a liquid amine cure catalyst comprising alkylated onium salt, substituted sulfur compound, substituted sulfide, ethylthioethanol, and fluoroboric acid.